Transformer Monitoring System

KONČAR TMS
Overview
Transformers are one of the key and most valuable components in a power system. Equipping them with an on-line monitoring system is essential for information gathering, condition assessment, better management and decision making.

Decades of experience in transformer design, production and on-site diagnostics as well as a field-proven hardware platform are built into Končar TMS – a state-of-the-art monitoring and diagnostic system.

Benefits
• Detects incipient faults and assists in preventing failures and unplanned outages
• Enables the condition based maintenance
• Improves staff safety and environmental protection
• Provides valuable data for a root cause analysis and an investigation in case of a failure event
• Helps in optimizing transformer performance and enables better asset management (overloading, lifetime expectancy estimations)
• Makes your transformer ready for the ‘Smart Grid’

Features
• Comprehensive on-line monitoring system for all types of power transformers and shunt reactors
• Modular and expandable system for a new or an existing transformer (retrofitting), open to any transformer manufacturer
• Provides monitoring and diagnostic for all vital transformer parts by integrating the available sensors and supporting various IED communication protocols
• Built-in models for transformer condition assessment (bushings, thermal model, insulation ageing, cooling efficiency, OLTC)
• Advanced trending analysis tools
• Interpretation methods of fault gas analysis according to the relevant IEC and IEEE standards
• User defined alarm limit and gradient setting
• Long term archival of data and event logging
• Periodic automatic report generation
• Various remote access options
Monitoring functions
Due to modularity any of the following functions may be included in the system:

**Bushings**
- Operating voltages
- Overvoltages
- Change of bushing capacitance
- Tan delta /power factor
- Loading current (single or three phase)

**Active part**
- Power (apparent, active, reactive)
- Losses
- Oil temperature (top, bottom)
- Ambient temperature
- Hot-spot temperature (calculation or fiber optic measurement)
- Gas in oil (single or multi gas sensors)
- Moisture in oil and paper
- Paper insulation ageing and lifetime

**Partial discharges**
- Electrical, acoustic and UHF methods available

**On-Load Tap Changer**
- Tap position
- Number of switching operations
- Switching time
- Power consumption of the OLTC motor drive
- OLTC oil temperature and differential
- Sum of switched current
- Contact wear

**Cooling system**
- Oil temperatures at the cooler inlets and outlets
- Cooling efficiency
- Running hours of pumps and fans
- Content of gas in the Buchholz relay
- Oil level in the conservator
- Intelligent cooling control
- Auxiliary equipment statuses and alarms (pressure relief device, OTI, WTI, Buchholz relay, etc.)

**Tools**
- Trend analysis
- Alarms and events logging
- Loading forecast
- Data export to text and Microsoft Excel
- Automatic report generation
## Monitoring System Specification

<table>
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<tr>
<th><strong>Architecture</strong></th>
<th>Data acquisition unit with the real-time controller installed on the transformer and industrial PC installed in the control/telecom room</th>
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</table>
| **Inputs and outputs** | DC analog inputs: 4-20 mA; 0-10 V DC  
AC analog inputs (CT): 0-1/5 A  
RTD inputs: Pt-100  
Digital inputs: dry contacts with 24V wetting  
Analog outputs: 4-20 mA  
Digital outputs: potential free contacts (SPDT relays)  
Quantity: as per requirement  
All channels protected from overvoltages and overcurrents |
| **Data logging** | SQL database used for long-term data, alarms and events archival  
Event driven data acquisition results in a reduced database size |
| **Data visualization** | Web browser or client application for local and remote access |
| **Communication** | Physical layer: RS-232, Ethernet 10/100, Fiber optic |
| **Supported protocols** | IEC 61850; IEC 60870-5-101 and 104; Modbus; OPC |
| **Power supply** | Universal switching power supply  
Voltage: 85 V AC - 264 V AC, single phase  
Frequency: 45 – 65 Hz |
| **Cabinet** | Material: Painted stainless steel (color selection per RAL scale)  
Rating: IP54 (standard), IP66 (on request)  
Mounting: on a tank wall or a stand |
| **Operating temperature** | -40 to +60°C |
| **Standards compliance** | EMC Directive 2004/108/EC and standards:  
EN 61000-6-2:2005; EN 61000-6-4:2007; EN 61000-3-2:2006; EN 61000-3-3:2008  
LVD Directive 2006/95/EC and standards:  
EN 60950-1:2006 + A11:2009 |

### Services

- Consulting services on how to select the optimal condition monitoring system for a new or an old transformer
- Installation and commissioning
- Staff training
- Recommendation of limit values (alarms) settings
- Expertise in interpretation of the acquired monitoring results

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